The daily electricity demand is shown in Fig.1. The power outputs of wind and solar generators are shown in Fig.2 and Fig.3, respectively. The parameters of microgrid are shown in Table I, and Table II.

 

Fig. 1. Load demand Fig. 2. Power output of wind generators



Fig. 3. Power output of PV generators

TABLE I Microgrid Parameters

|  |  |
| --- | --- |
| Parameter | Value |
| Installed capacity of gas-fired generators | 13,460 kW |
| Total installed PV capacity | 2,240 kW |
| Installed wind farm capacity | 2,240 kW |
| Charge/discharge efficiency of battery storage/ | 95% |
| Installed battery capacity/ | 1000kW / 2000 kWh |

TABLE II Biogas Production Parameters

|  |  |
| --- | --- |
| Parameter | Value |
| Volume of anaerobic digester | 20,000 m³ |
| Initial TS concentration | 25 kgVS/m³ |
| Initial temperature | 25°C |
| Biochemical methane potential | 0.42 m³/kg |
| Microbial fermentation parameters// | 0.015 / -0.129 / 0.802 |
| Feedstock heat exchange efficiency | 50% |
| Biogas charge/discharge efficiency/ | 92% |
| Biogas storage capacity/ | 1000 m³ / 60,000 m³ |
| Lower heating value of biogas | 6.6278 kWh/m³ |
| Biogas generator efficiency | 35% |
| Installed biogas generator capacity | 1500 kW |
| Installed electric boiler capacity | 600 kW |